ULTRA-THIN CONCRETE WHITETOPPING MSP-98-09E

1.0 Description. This specification covers materials and construction requirements for producing and placing an Ultra-Thin Concrete Whitetopping (UTW) pavement to be placed in conformance with the lines, grades, and typical cross sections shown on the plans, or as established by the engineer.

1.1 UTW pavement is a fiber reinforced concrete pavement, ranging from 2 to 4 inches (50 to 100 mm) in thickness, placed over a prepared asphalt surface. Unless otherwise specified in the plans, the minimum UTCW pavement thickness shall be 4.0 inches (100 mm). The prepared base asphalt must have a minimum thickness of 3 inches (75 mm). The UTCW pavement shall meet all the applicable requirements of Sec 502, except as modified herein.

1.2 Note to engineer and contractor: UTW is intended to be placed in a uniform thickness on a final grade which has been established by other means, such as coldmilling. Payment for the quantity of concrete is intended to compensate for rough surfaces, and not for grade adjustments.

2.0 Materials. All materials shall conform to Division 1000, Materials Details, unless otherwise noted.

2.1 Fibrillated polypropylene fibers shall be added at a rate of 3.0 pounds per cubic yard (1.8 kilograms per cubic meter).

2.1.1 All fibers shall be measurable by weight (mass). Fibers may be measured in bags, boxes, or like containers with the approval of the engineer. Such bags, boxes, or containers shall be sealed by the fiber manufacturer, shall have the weight (mass) contained therein clearly marked, and shall be in a like new condition. No fraction of an unsealed bag, box or like container delivered unsealed, or left over from previous work, shall be used unless weighed. Fibers shall be added to the concrete mix and mixed according to their respective manufacturer's recommendations.

2.2 When requested by the contractor, an approved high range water-reducing admixture may be used, subject to approval of the engineer. When a high range water-reducing admixture is used, the slump of the concrete, achieved with water, shall not exceed 3 inches (75 mm) before the high range water-reducing admixture is added to the mix. After the high range water-reducing admixture is added to the mix, the slump may be a maximum of 6 inches (150 mm) at the time of placement. No re-dosing of high range water-reducing admixture will be allowed.

2.3 Other admixtures for the purpose of otherwise reducing the water, retarding or accelerating the set may be used with the approval of the engineer, however they shall meet applicable specifications.

2.4 Type 3 cement, accelerators and/or blankets may be used to enhance curing for fast track paving, provided the final concrete product is not harmed.

3.0 Mix Design.

3.1 The contractor shall develop the job mix formula, meeting Sec 501 Pavement Concrete, and furnish certified test results from an independent testing laboratory for the engineer's approval. Approved MoDOT Sec 1005 paving aggregate gradations shall be used. The minimum cement factor specified for pavement concrete shall apply. The maximum cement

requirement may be increased up to an additional 141 pounds per cubic yard (64 kg per cubic meter) at the contractor's option. The mixture shall be designed to develop a minimum compressive strength of 3500 psi (24 MPa). The maximum aggregate size shall not be more than 1/3 the thickness of the UTW pavement. The engineer will approve the design mix and all materials and methods prior to use.

3.2 Any admixtures used shall require certification from the fiber manufacturer for compatibility with fibers used in concrete.

3.3 No mix design changes will be allowed during placement of the UTW pavement without the approval of the engineer.

4.0 Construction Requirements.

4.1 Surface Preparation. The existing bituminous surface shall be coldmilled in accordance with applicable requirements of Sec 622.10 and as indicated elsewhere in the contract.

4.1.1 Immediately prior to applying the UTW pavement, the surface shall be dry, and thoroughly cleaned of all vegetation, dirt, mud, and other objectionable materials. All dust and loose particles shall be completely removed just prior to paving by vacuum or air blowing.

4.1.2 The asphalt surface temperature shall be less than 100 F (38 C) at the time of UTW application. This may require night placement, water fogging or other approved means of obtaining a cooler surface, however there shall be no puddled water or other contamination to prevent bonding to the asphalt surface.

4.2 Placement. UTW pavement shall be placed at the depths and locations shown on the plans.

4.2.1 Trucks used for transporting concrete will be permitted to drive on the pavement being overlaid and deposit concrete directly in front of the concrete spreader, provided no loose foreign material is tracked onto the surface.

4.2.2 UTW pavement shall be free of fiber balls when placed in the work.

4.2.3 The concrete temperature shall not exceed 90 F (32 C) when delivered to the site. THE CONTRACTOR IS ADVISED THAT HIGH WATER EVAPORATION CONDITIONS SHOULD BE AVOIDED UNDER ALL CONCRETE POURING CIRCUMSTANCES.

4.3 Surface Finish. The surface of the UTW pavement shall be tined with a wire comb as specified in Sec 502. At the option of the contractor, in lieu of wire tinning, the contractor may perform PCCP diamond grind texturing in accordance with MSP-96-19 included in this contract. If PCCP diamond grind texturing is used, the specified twenty one day time delay shall not apply and grinding may proceed as soon as 3500 psi (24 MPa) has been attained, and thickness deficiency and profile requirements shall be revised as shown for PCCP diamond grind texturing.

4.4 Joints. Sawing of the joints shall commence as soon as the UTW pavement has hardened sufficiently to permit sawing without excessive raveling. The UTW pavement joints may be cut utilizing an "early entry" or "green-cut" saw. The joints shall be spaced equidistant longitudinally and transversely, and at a distance in inches approximately equal to twelve times the specified UTW thickness. Slight adjustments may be made in the joint spacing to equalize the longitudinal joints between pavement cast edges. All sawed UTW units shall be square except

as necessary in pavement width transitions. In that instance slight field adjustments may be necessary to maintain relatively square units. Joint spacing for any adjustments shall not exceed 1 foot (300 mm) greater than the intended "12 times specified UTW thickness". Transverse joints on adjoining lanes shall match. The minimum depth of the joints shall be thickness/4 and the width of the joint shall be 1/8 inch (3 mm) maximum. The joints are not to be sealed but shall be cleaned of all deleterious material after sawing. Cracking as a result of late sawing may require replacement, at the option of the engineer, by the contractor with no additional reimbursement. THE CONTRACTOR IS ADVISED THAT DUE TO THE THINNESS AND TEMPERATURE SUSCEPTIBILITY OF UTW, SEVERAL JOINT SAW UNITS MAY BE REQUIRED TO AVOID CRACKING.

4.5 Curing. Curing compound shall be applied at 1.5 times the normal application rate. If blankets are used for fast tracking, they shall be light in color and shall not take the place of a curing compound. The temperature under the blanket shall not exceed 160 F (71 C). Blankets shall not be removed until the temperature under the blanket is within 40 F (20 C) of the ambient temperature.

4.6 Opening to Traffic. The UTW pavement shall not be opened for light traffic until the concrete has attained a minimum compressive strength of 3000 psi (21 MPa). UTW pavement, including fast tracked, shall not be opened to all types of traffic until the concrete has attained a minimum compressive strength of 3500 psi (24 MPa). Compressive strength will be determined by tests made in accordance with MoDOT methods.

5.0 Method of Measurement.

5.1 Measurement for furnishing UTW concrete will be made to the nearest 0.1 cubic yard (meter), for material incorporated into the UTW pavement.

5.2 Measurement for placing UTW pavement will be computed to the nearest 0.1 square yard (meter).

5.3 The final pavement will be cored in accordance with Sec 502 and all pavement thickness deficiencies will apply, except that any pavement deficient enough in thickness to require 100 percent reduction in contract price shall be replaced and will not be allowed to remain in place. All profile index requirements will apply.

5.4 Otherwise, final measurement of the complete UTW pavement will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

5.5 Measurement for coldmilling bituminous pavement for removal of surface will be made in accordance with Sec 622.

6.0 Basis of Payment.

6.1 The accepted quantity of UTW concrete will be paid for at the contract unit price for UTW concrete, per cubic yard (meter).

6.2 Payment for the placement of UTW pavement will be made at the contract unit price for UTW pavement, per square yard (meter), to include all surface preparation following cold milling of the bituminous surface. No direct payment will be made for furnishing labor, equipment, reinforcement, and other materials to place, finish, texture, and cure the UTW pavement

including sawing the joints, in accordance with the plans and specifications.

6.3 Any adjustments in payment as a result of the profilograph index or pavement thickness deficiency of the UTW pavement will be made to the unit contract prices for UTW pavement, per square yard (meter), and UTW pavement placed, per cubic yard (meter). For this purpose, the volume of UTW pavement placed per cubic yard (meter) price will be adjusted to a square yard (meter) price based on the plan UTW pavement thickness.

6.4 Payment for coldmilling bituminous pavement for removal of surface will be made in accordance with Sec 622.